Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 90 of the	)	
Commission's Rules to Provide	)	
for the Use of the 220-222 MHz Band	)	PR Docket No. 89-552
by the Private Land Mobile	)	
Radio Service	)	
	)	
Implementation of Sections 3(n) and 332	)	
of the Communications Act	)	GN Docket No. 93-252
	)	
Regulatory Treatment of Mobile Services	)	
	)	
Implementation of Section 309(j) of the	)	
Communications Act-Competitive	)	PP Docket No. 93-253
Bidding, 220-222 MHz	)	

To: The Commission

REPLY OF SMR ADVISORY GROUP L.C.
TO THE COMMENTS ON PETITIONS FOR RECONSIDERATION

By: Laura C. Mow, Esq.
GARDNER, CARTON & DOUGLAS
1301 K Street, N.W.
Suite 900, East Tower
Washington, D.C. 2000
(202) 408-7205

Its Attorney

June 18, 1997

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REPLY OF SMR ADVISORY GROUP, L.C. TO THE COMMENTS ON PETITIONS FOR RECONSIDERATION

SMR Advisory Group, L.C. ("SMR Advisory"), by its counsel and pursuant to Section 1.429 of the Rules and Regulations of the Federal Communications Commission ("FCC" or "Commission"), hereby submits this reply to the comments on the various petitions for reconsideration of the FCC's Third Report and Order ("Third Report") in the captioned proceeding.[1/]

[1/] *In the Matter of Amendment of Part 90 of the Commission's Rules to Provide for the Use of the 220-222 MHz band by the Private Land Mobile Radio Service*, PR Docket No. 89-552, Third Report and Order and Fifth Notice of Proposed Rulemaking, FCC 97-57 (released March 12, 1997) ("Third Report").

Eleven parties filed petitions for reconsideration of the Third Report, including SMR Advisory.[2/] In its Petition, SMR Advisory urged the Commission to reconsider its decision in two respects. First, SMR Advisory argued that the interference protection standard adopted by the Commission with respect to Phase II-to-Phase I operations was inadequate. That standard allowed Phase II licensees to locate their stations at least 120 kilometers from the base stations of co-channel Phase I licensees with no further showing of interference protection to the Phase I licensee, and to locate their stations less than 120 kilometers from the Phase I station if the Phase II licensee could demonstrate at least 10 dB protection to the 38 dBuV/m contour of the Phase I licensee's station. SMR Advisory urged the Commission to replace this adopted standard with one which would require the Phase II operator to provide at least 10 dB protection to the Phase I licensee's 28 dBuV/m contour.[3/] Second, SMR Advisory noted an apparent void in the Third Report with respect to any procedures pursuant to which Phase I licensees could make even the most minor of modifications to their stations, and asked the Commission to ensure that Phase I licensees could freely modify their systems so long as the change did not increase their specified protected contour.[4/]

[2/] These parties are: American Mobile Telecommunications Association ("AMTA"); INTEK Diversified Corp. ("INTEK"); National Communications Group, et al. ("NCG"); Rush Network Corp. ("Rush"); Glenayre Technologies, Inc. ("Glenayre"); Personal Communications Industry Association ("PCIA"); SEA, Inc. ("SEA"); Global Cellular Communications, Inc. ("Global"); Comtech Communications, Inc. ("Comtech"); and Metricom, Inc. ("Metricom").

[3/] SMR Advisory Petition, at 5-9.

[4/] SMR Advisory Petition, at 9-11. Such procedures would provide Phase I licensees the necessary flexibility to ensure continuous quality service to the public and were consistent with the rules adopted by the FCC for similarly-situated licensees in the 800 and 900 MHz services.

Of the ten other parties filing petitions for reconsideration of the Third Report, AMTA, PCIA and INTEK echoed the concerns expressed by SMR Advisory in its Petition; no other party expressed a view on these subjects. Of the seven parties filing comments on the petitions for reconsideration, INTEK, US Mobilcomm, Inc., SEA and the Police Emergency Radio Services, Inc. supported the changes urged by SMR Advisory; no party opposed the suggested changes.[5/] In light of the lack of any opposition to SMR Advisory's Petition, and the overwhelming evidence in favor of the urged changes, SMR Advisory renews its request that the FCC modify the rules adopted to govern the 220 MHz service as discussed herein.

I.

DISCUSSION

A. All of the Technical Evidence Supports a 28 dBu Protected Contour for Phase I Licensees.

As noted by SMR Advisory in its Petition, during the course of the proceeding below, all of the parties commenting on this issue believed that the 38 dBu contour was not an accurate depiction of reliable service in the 220 MHz service.[6/] Certain parties have included additional technical data in this phase of the proceeding further supporting a 28 dBu protected contour for

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[5/] In addition to SMR Advisory, comments on the Petitions for Reconsideration were filed by INTEK, US Mobilcomm, Inc., SEA, Metricom, Police Emergency Radio Services, Inc. ("PERS") and Arch Communications Group, Inc. ("Arch").

[6/] See, e.g., AMTA Reply Comments, at 2-3; Incom, Inc. Comments at 5; USA Mobilcom Reply Comments at 1; SMR Advisory Reply Commnets, at 8; Comtech Comments, at 14-15; E.F. Johnson Comments, at 7. For purposes of this reply, the term "reliable service" is defined based on the Commission's own methodology using the F(50,50) Field Strength Chart for Channels 7 through 13 in Section 73.699 of the FCC's Rules (Figure 10) with a 9 dB correction factor for antenna height differential. This methodology purports to reveal that point at which fifty percent (50%) of the locations receive service fifty percent (50%) of the time.

Phase I licensees.[7] In order to provide the Commission with even more technical data to ensure that its decision is as informed as possible, SMR Advisory recently commissioned an independent technical analysis by The Richard L. Vega Group, Inc. which it has attached hereto as Exhibit A.[8] That analysis considers the technical basis for selecting a protected contour in the 220 MHz service, taking into account the different characteristics of frequencies in the 220 MHz band and frequencies in other bands where the FCC already has established protected contours. The Vega Technical Report concludes, after consideration of these and other factors, that the 28 dBu protected contour more accurately reflects that point at which reliable 220 MHz service is being provided to the public. Moreover, the Vega Technical Report further shows that application of the 28 dBu protected contour (with a 10 dBu interfering contour) in turn, requires a minimum co-channel distance separation of 170 kilometers, rather than the 120 kilometer distance separation distance adopted by the Commission.

1. Application of the FCC's Own Methodology Requires Specification of a 28 dBu Protected Contour for Phase I Licensees.

When the Commission first proposed and adopted the 38 dBu protected contour for Phase I licensees, all of its reference data for determining contour distances in the 220 MHz service was based on frequencies located up to 700 MHz higher on the frequency band than the frequencies employed in the 220 MHz service.[9] The extent of the Commission's calculations appears to

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[7] See, e.g., PERS Reply Comments, at para. 11 and Exhibits 1A through 3C.

[8] See "Interference Calculation and Distance Separation Report for the 220 MHz Mobile Radio Service, dated June 18, 1997, by The Richard L. Vega Group, Inc. (the "Vega Technical Report").

[9] See *Amendment of Part 90 of the Commission's Rules to Provide for the Use of the 220-222 MHz by the Private Land Mobile Radio Services*, 4 FCC Rcd 8593, 8601 (1989) ("220 MHz NPRM");

have been a simple reduction by 2 dB from the 40 dB protected contour utilized in the 800/900 MHz bands, to arrive at the 38 dBu protected contour for the 220 MHz service. This selection failed to account, however, for distinct differences in the fading ratios and effects between frequencies in the 220 MHz band and in the 800/900 MHz bands. As noted by the Vega Technical Report, the higher the frequency is located on the frequency scale, the greater the effects of the ground losses on propagation.[10/]

The Commission has acknowledged the need to make adjustments accounting for the differences in propagation characteristics between frequencies located at different points on the frequency band. The protected contour utilized for stations operating in the UHF band, for example, is 8 dB higher than the protected contour for stations operating in the VHF band -- frequencies located approximately 600 MHz lower than UHF frequencies.[11/] In selecting the appropriate protected contour for the 220 MHz service, the Commission should have considered both the 40 dBu protected contour utilized in the 800 and 900 MHz specialized mobile radio services (up to 700 MHz higher than frequencies in the 220 MHz service) as well as the 32 dBu protected contour used in the cellular mobile radio service (which also operates in the 800 MHz

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Amendment of Part 90 of the Commission's Rules to Provide for the Use of the 220-222 MHz Band by the Private Land Mobile Radio Service, 6 FCC Rcd 2356, 2371 (1991) ("220 MHz Report and Order").

[10/] See Vega Technical Report, p. 4.

[11/] UHF Channel 69, for example, operates on 801 MHz, while VHF Channel 13 operates on 216 MHz. Like the 220 MHz service, the protected contours in the UHF and VHF service are based on the F(50,50) curves referenced at Section 73.699, figure 10b of the FCC's Rules. See also Vega Technical Report, at 4 & Exhibit 1.

band). Application of the same methodology which was employed in each of these services should have resulted in a protected service contour for the 220 MHz service of at least 28 dBu.[12]

2. Field Measurements Also Support a 28 dBu Protected Contour for the 220 MHz Service.

In order to provide independent field data to support its recommendation, SMR Advisory also gathered signal strength readings on an operating station located at Preston, Washington (due east of Seattle). Field personnel took signal strength readings with system spectrum analyzers at three (3) equidistant points along four (4) different radials.[13] The readings along each radial were taken at approximately sixteen (16), thirty-two (32) and forty-eight (48) miles (the latter representing the generally acknowledged distance associated with the 28 dBu contour).[14] As can be seen by the tabulated results of the measurements contained in the Vega Technical Report at Exhibit 3, the readings at the 28 dBu contour point consistently showed reliable service.

B. A 28 dBu Protected Contour in the 220 MHz Service Requires A Minimum Co-Channel Distance of 170 Kilometers.

In the Third Report, the Commission adopted a minimum 120 kilometer co-channel distance separation between Phase I and Phase II stations. According to this rule, a Phase II licensee may always locate its station 120 or more kilometers from a Phase I licensee with no

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[12] See Vega Technical Report, at 3-6.

[13] Data at four additional radials was unavailable due to the mountainous terrain.

[14] See Vega Technical Report, at 6 & Exhibit 3. SMR Advisory is continuing to take readings at other sites with different terrain, operational and propagation features. Time constraints did not permit further readings to be completed by the date of this filing.

interference showing. To the extent that a Phase II licensee desires to locate its station less than 120 kilometers from the Phase I licensee, it must demonstrate that it will provide 10 dB interference protection to the Phase I licensee's specified protected contour.[15/] All of the parties commenting on this issue argued that this distance was inadequate.[16/] SMR Advisory concurs that the proposed 120 kilometer minimum distance standard will not ensure 10 dB interference protection to existing 220 MHz operations.

To the extent that a Phase II licensee locates its station 120 kilometers from a Phase I licensee's station, the 18 dBu interference contour of the Phase II licensee would result in harmful interference to a substantial portion of the Phase I licensee's 28 dBu contour.[17/] Moreover, this effect is magnified if another Phase II licensee locates its station 120 kilometers in the opposite direction.[18/] By measuring the interfering contour of the Phase II licensee which maintains a 10 dB ration of protection (18 dBu), a minimum of 104.1 kilometers is needed to accommodate that contour. The 28 dBu contour of the Phase I licensee, on the other hand, typically will extend 64.3 kilometers. The minimum co-channel distance that will ensure 10 dBu interference protection to the Phase I licensee's 28 dBu contour, therefore, is 170 kilometers.[19/]

15/ Third Report, para. 173; see also 47 C.F.R. § 90.763.

16/ See, e.g., AMTA Petition, at 5-6; INTEK Petition at 4-5; SEA Comments, at 12-13.

17/ The models generated in the Vega Technical Report attached as Exhibits 4 and 5 thereto, are based on maximum allowable operating configuration (i.e., 150 meters HAAT/500 watts ERP).

18/ See Vega Technical Report, at 6-7, Exhibit 4. It should be pointed out that the Phase II licensee's service area also will be compromised if the 120 co-channel distance minimum is maintained, leading to unhappy customers on both systems.

19/ See Vega Technical Report, at 6-7, Exhibit 5.

Of course, to the extent that unique terrain or other features justify a lesser distance separation, the Phase II licensee should be permitted to demonstrate that it could provide 10 dB protection to the 28 dBu contour of the Phase I licensee at the lesser distance.

C. The Commission Should Adopt Modification Procedures for Phase I Licensees Utilizing Maximum Facility Values.

In its Petition, SMR Advisory urged the Commission to adopt modification procedures for Phase I licensees.[20] In particular, SMR Advisory argued that Phase I licensees should be permitted to modify their facilities so long as the changes do not increase their specified protected contour. This concept of full flexibility within a specified geographic area -- whether defined by Economic or Regional Areas or by contours -- has been employed in all other services competitive with the 220 MHz and is fully supported by all parties commenting on this issue. It is inconceivable that the Phase I licensees are to be frozen in place with no opportunity to make the sort of operational changes that any normal business is required to make from time to time. The lack of such procedures in the Third Report constitutes a serious deficiency in that order which must be remedied if the current 220 MHz operators are to compete successfully in the marketplace.

Several parties have urged the Commission to specify that maximum facility values will be used in determining the Phase I licensees' protected contour, both for purposes of calculating interference and permissible modifications to the station.[21] SMR Advisory supports these

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[20] SMR Advisory Petition, at 9-11.

[21] See, e.g., INTEK Petition, at 5-6; PCIA Petition, at 2-3; SEA Comments, at 14.

parties and adds its request that maximum facility values be used for these purposes. Phase I licensees have never had an opportunity to make meaningful changes to their technical parameters.[22/] Applying maximum facilities will more closely track actions in other services, and will afford Phase I licensees the flexibility to make those adjustments within specified protected contour that will better ensure efficient and continuous service to the public.

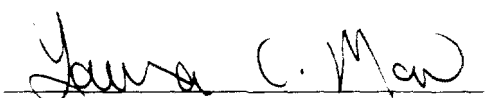
III.

CONCLUSION

Accordingly, based on the foregoing, SMR Advisory urges the Commission to reconsider its decision in the captioned proceeding and to make changes consistent with the suggestions made herein.

Respectfully submitted,

SMR ADVISORY GROUP, L.C.

By: 

Laura C. Mow, Esq.
GARDNER, CARTON & DOUGLAS
1301 K Street, N.W.
Suite 900, East Tower
Washington, D.C. 2000
(202) 408-7205

June 18, 1997

Its Attorney

22/ All modifications to Phase I licenses were frozen from 1991 through early 1996. Although the Commission finally permitted these licensees to make limited modifications to their licenses in 1996, these changes were limited to relocations; any increase in ERP was prohibited.

EXHIBIT A

INTERFERENCE CALCULATION AND DISTANCE SEPARATION REPORT FOR THE 220 MHZ MOBILE RADIO SERVICE DATED JUNE 18, 1997

Prepared by: ***THE RICHARD L. VEGA GROUP, INC.***
1245 West Fairbanks Avenue, Suite 380
Winter Park, Florida 32771-4878
Telephone: (407) 539-6540
Facsimile: (407) 539-6547

I.
INTRODUCTION

In response to the Federal Communication Commission's ("FCC") **Third Report and Order** ("Third Report"),[1/] released March 12, 1997, this Interference Calculation and Distance Separation Report presents evidence supporting the modification of certain rules adopted in the Third Report.

In the Third Report, the FCC decided to utilize a 38 dBu protected service contour and 28 dBu interfering contour as the points of reference for maintaining non-interference to a Phase I 220 MHz licensee.[2/] As support for this decision, the FCC contends that the referenced 38 dBu signal contour adequately projects the "service contour" of the average 220 MHz radio facility.[3/] Further, the FCC concludes that a 28 dBu interfering contour adequately projects the contour necessary to determine the presence of interference at the desired stations' 38 dBu protected contour.[4/] These contour references are incorrect as evidenced herein.

This report demonstrates that a 28 dBu protected service contour and an 18 dBu interfering contour are the more appropriate references. Further, as will be shown in this report, these values, in turn, dictate a co-channel distance separation figure of 170 kilometers, rather than the 120 kilometer figure adopted by the FCC in the Third Report. Finally, this report will show that a Phase I licensee must be allowed full protection to its protected contour from Phase II licensees based on maximum allowable operating facilities.

1/ Third Report, P.R. Docket No. 89-552, RM-8506.

2/ Phase I licensees refers to the licensees who originally filed applications for 220 MHz licenses in response to the FCC's initial Report and Order in the 220 MHz service, Report and Order, 6 FCC Rcd 2356 (1991) ("First Report") and are also referred to herein as the "incumbent" licensees.

3/ Third Report, at para. 173.

4/ Id.

II.
BACKGROUND

The origin of the FCC's contour protection and co-channel separation requirements can be traced to the **NOTICE OF PROPOSED RULEMAKING** ("First NPRM") issued in 1989,[5/] in which the FCC proposed rules to establish and govern the 220 MHz service. In that order, the FCC proposed allowable maximum values of 200 watts ERP and HAAT of 90 meters for 220 MHz transmitters, with mobile units limited to 20 watts ERP.[6/] The FCC concluded that, at these values, a co-channel distance separation of 120 kilometers would "permit frequency reuse" and provide a service area "with a radius of about 35 kilometers."[7/] In proposing these references for the 220 MHz Service, the FCC apparently relied exclusively on its 1974 Second Report and Order ("900 MHz Second Report"), in which it established contour protection standards for the 900 MHz Specialized Mobile Radio service ("SMR").[8/] The 900 MHz Second Report adopted a protected contour of 40 dBu, an interfering contour of 30 dBu and a co-channel separation distance of 70 miles (or 112.5 kilometers), based on maximum facilities of 1000 watts ERP and 1000 ft HAAT.[9/]

Following the receipt of comments on its First NPRM, the FCC increased the maximum allowable power and height configuration for the 220 MHz radio service to 500 watts ERP with an antenna HAAT of 150 meters and a mobile unit maximum of 50 watts ERP.[10/] Despite the significant change in these technical parameters and an acknowledgment that the predicted service area therefore would increase,[11/] the FCC failed to modify either its proposed 38 dBu protected contour measurement or its proposed co-channel separation standard of 120 kilometers.

The FCC is now preparing to accept Phase II applications in the 220 MHz service. The FCC has concluded that a 38 dBu protected contour for the desired station and a 28 dBu interfering contour for the undesired station with a 120 kilometer co-channel

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5/ 4 FCC Rcd 8593 (1989).

6/ Id.

7/ First NPRM, 4 FCC Rcd at 8601.

8/ 46 F.C.C. 2d 752, 774, n. 26 (1974).

9/ 46 F.C.C. 2d at 774-5.

10/ First Report, 6 FCC Rcd at 2371.

11/ The FCC noted in this regard that "increasing the maximum size base station facility to 500 watts ERP and 150 meters HAAT, a 38 dBu signal level [could] be expected at a distance of 45 kilometers (28 miles). 6 FCC Rcd at 2371. As will be shown in this report, the FCC's assumption 45 kilometers severely underestimated actual service coverage for 220 MHz systems.

separation between stations, adequately protects existing Phase I operations. This report will demonstrate that these figures will not adequately protect existing 220 MHz operations and, in fact, will result in significant harmful interference both to Phase I and to Phase II operations.[12/]

III.
DISCUSSION

MODIFICATION TO THE CONTOUR PROTECTION FIGURES

The extent to which the Phase I licensees are protected by the Phase II licensees depends primarily on two factors: the contour protection figures and the co-channel separation distance. With respect to the first factor, the primary issue considered in this report is whether the 38 dBu contour adopted by the Commission as the protected contour for Phase I systems is the proper value for predicting actual coverage of systems operating in the 220 MHz service.

One significant problem with the Commission's selection of the 38 dBu protected contour for the 220 MHz service is its point of reference for concluding that a 220 MHz system will have a service radius that corresponds to a 38 dBu contour. As can be seen from the First NPRM and the First Report, all of the Commission's reference data for determining contour distances in the 220 MHz service is based on frequencies located up to 700 MHz higher than 220 MHz service. As a result, there has been no adjustment for differences in fading ratios and frequency effects inherent between these bands.[13/] As will be shown below, a 28 dBu protected contour with interfering contour of at least 18 dBu (18 dBu ratio is recognized in mobile applications) is the more appropriate measurement of interference potential in those cases where an applicant intends to locate its site within the recommended distance separation.[14/]

12/ Although this analysis is equally applicable to Phase I to Phase I operations, this report does not recommend changing the FCC's existing interference standards under these circumstances. For the most part, these systems are all constructed and presumably have already taken steps to coordinate system design to account for interference between system operations.

13/ Furthermore, use of a 9 dB correction factor to account for the mobile antenna is incorrect and it should be reduced to a 3 dB correction factor. Although the studies compiled herein have retained the 9 dB correction factor for simplicity, this figure is incorrect since it was based on transceivers with lower sensitivity levels and lower power levels (i.e. cellular radios generally operate at a maximum level of 3 watts).

14/ The predicted 38 dBu contour of the Phase I licensee's station is calculated using the F(50,50) Field Strength Chart for Channels 7 through 13 in Section 73.699 of the FCC's Rules (Figure 10), with a 9 dB correction factor for antenna height differential. The predicted signal from the undesired station is calculated using the F(50,10) Field Strength Chart for Channels 7 through 13 in Section 73.699 of the FCC's Rules (Figure 10a), with a 9 dB correction factor for antenna height differential.

The approximately 700 MHz difference between 220 MHz and 800/900 MHz frequencies gives rise to a number of significant differences in system performance. It is accepted engineering knowledge that the higher the frequency, the greater the ground losses will effect propagation. The attenuating effects of free space losses at UHF frequencies have been shown to substantially exceed those effects at VHF frequencies. Actual receiver signal varies enormously with frequency, even though the transmitter power, site, and antenna height remain fixed.[15/] Hence, it is unreasonable to simply utilize a common or near-common contour reference figure to calculate protected and interfering contours of two (2) services (800/900 SMR vs. 200 SMR) separated by up to 700 MHz of frequency.

In the First NPRM, the FCC reduced, by 2 dB, the proposed contour protection figure from 40 dBu for 800/900 SMR systems to 38 dBu for 220 MHz systems. The distinct frequency trends and the propagation differences between the two services discussed above, however, requires a far greater dB reduction. When the *Carey* curves were created, it was recognized that the significant differences in propagation characteristics between VHF frequencies and UHF frequencies required an adjustment to the protected contour reference figures to accommodate for the substantial differences in frequency effects at the different bands. Specifically, stations operating in the UHF band (channel 14 through 69), were subject to a 64 dBu protected contour based on the F(50/50) curves referenced at Section 73.699, figure 10b of the FCC's Rules. In the VHF band (channels 6 through 13), the broadcast station's protected contour was based on the 56 dBu protected signal which was calculated using the same charts as those used for 220 MHz licensees referenced at 73.699, figure 10a. This establishes a benchmark 8 dB reduction to the contour protection for stations operating in frequencies up to 600 MHz lower than those in the UHF band to account for the superior propagation characteristics in the lower bands. See Exhibit 1.

The FCC's 40 dBu protected service contour for systems in the 800/900 MHz service also was calculated based on the F(50/50) curves referenced in 73.699, figure 10b. As reflected in the Third Report, however, the FCC has adopted a 38 dBu protected contour for stations operating at 220 MHz, even though it was purportedly basing this calculation on the same F(50/50) curves. See Exhibit 1. In order to maintain a consistent technical methodology, the Commission should apply an additional 10 dB reduction to the 220 MHz protected service contour to account for the 600 MHz difference between the 220 MHz band and the 800/900 MHz bands and the associated differences in propagation.[16/]

15/ *The Cellular Radio Handbook*, Second Edition, Neil J. Boucher.

16/ Additionally, the power level differences between VHF and UHF also are a factor for calculating protected contours. VHF stations are allowed 100 kw while UHF stations are allowed 5000 kw ERP. Similarly, in the 220 MHz service, stations are allowed 500 watts while 800/900 stations are allowed 1000 watts.

The Commission's conclusion that a mere 2dB difference between the adopted protected contours in these two services was appropriate is inexplicable given the differences in the bands and in the operational parameters described above.

The FCC's development of a protected service contour in the cellular mobile radio service (Part 22, Subpart H, Section 22.911) provides additional support for a modification to the 220 MHz protected contour. In the cellular service, the FCC concluded (after consideration of technical data submitted by the cellular industry) that the "outer bounds" of service was being provided at the 32 dBu contour which was significantly lower than the 40 dBu protected contour employed in the 800/900 MHz services, even though systems in the 800/900 MHz services operate in virtually the same frequency band as cellular.[17/] By contrast, the 38 dBu protected contour employed for the 220 MHz service -- which occupies frequencies approximately 600 MHz lower than those assigned to the cellular service -- is actually 6 dB higher than the 32 dBu protected contour figure used for cellular, even though cellular systems operate at frequencies with much more restrictive propagation characteristics. See Exhibit 2. A more appropriate and consistent accounting for the differences between the two frequency bands support a reduction from the 32 dBu protected cellular contour of at least 4 dB, resulting in a 28 dBu protected contour for the 220 MHz service with a corresponding minimum 10 dB C/I ratio to account for the frequency difference. Based on the knowledge gained through the development procedures used to create the *"Carey"* propagation curves (see Report No. R6602), the different power factors employed in the various services, and the protected contours in the 800, 900 and cellular services, therefore, support the contour protection figure for the 220 MHz service should be lowered to a more suitable level of 28 dBu with a 10 dB ratio for calculating the interfering contour in Phase II-to-Phase I situations. These contour figures provide a more realistic prediction of coverage as accepted by *Carey*.

Traditionally, the Commission has attempted to compensate for propagation anomalies in frequency bands (VHF/UHF) by affording the higher band service additional power measured in E.R.P. By example, the broadcast industry affords VHF stations 100 kw while UHF stations are generally allowed 5000 kw E.R.P. Again, the Commission recognizes that the inferior propagation characteristics would support additional power for those services in the UHF band. Even with the higher allowable power level, the UHF

17/ When the rules for the cellular service were first issued, the FCC adopted a 39 dBu protected contour as calculated using the same F(50-50) curves. Upon prompting from the industry that actual service coverage was significantly greater than was reflected by the 39 dBu contour, the FCC later changed this value to a 32 dBu contour formula that includes an 18 dB C/I figure. before adopting rules and accepting applications for unserved areas. It should be noted that the FCC utilizes an 18 dB interference contour both in the 800/900 MHz SMR and in the cellular radio service, while it uses a 10 dB interference contour in the 220 MHz service. Although the 18 dBu interference contour actually is the more appropriate measurement for the 220 MHz service as well, this report has focused instead on the desired station's protected contour as the most important factor to change. The fact that a smaller interference contour is used in these other services, however, has no impact on the appropriate dB strength of the protected service contour.

signal cannot overcome the huge losses associated with atmospheric and clutter attenuation effects at these higher frequencies.

To support the facts presented here which argue for a more realistic protected service area, signal strength was determined for an existing 220 MHz facility. A test procedure was implemented to collect field data from a 220 MHz facility near Seattle, Washington during June of 1997. The data was measured with a Hewlett Packard spectrum analyzer. The signal power is listed in decibels above one milliwatt for points along the eight basic radials at a radius of 16, 32, and 48 miles or over 77 km from the transmit facility. See Exhibit 3. More field data measurements will be supplied to the Commission to further support the validity of measured field signal strength.

A review of the pertinent orders shows no technical justification of the FCC's initial selection of the 38 dBu contour as an accurate reflection of coverage by a 220 MHz system. Given the factors discussed above, a 28 dBu protected contour and an 18 dBu interfering contour are the appropriate measurements for the 220 MHz service.

MODIFICATION TO DISTANCE SEPARATION

The second factor considered in determining the appropriate degree of protection which should be afforded the Phase I licensees is the co-channel distance separation requirement between Phase I stations and Phase 2 stations. In its Third Report, the FCC adopted a minimum 120 km co-channel distance separation between Phase I and Phase II stations.[18/] The FCC further noted that a Phase II licensee desiring to locate closer than 120 km would be required to show that it would provide at least 10 dB interference protection to the adjacent Phase I licensee's protected contour.[19/] As will be shown below, this 120 km co-channel separation will not ensure 10 dB interference protection to existing 220 MHz operations.

When a model is generated using the FCC's methodology to calculate a protected contour of 28 dBu based on the power and height maximums specified in the First Report, it is clear that harmful interference (defined as a less than 10 dB interference buffer) will always occur to the Phase I system located within 120 kilometers of a Phase II system. See Exhibit 4. Based on a maximum allowable operating configuration (150 meters HAAT\500 watts ERP), an average 220 MHz operation will realize a 64.3 kilometer contour "service area" using a 28 dBu contour with a 9 dB correction factor. The 10 dB ratio of protection (18 dBu), assuming maximum facilities, for the undesired station would result in a interfering contour of 104.1 km, thereby necessitating a minimum distance separation of at least 170 km. See Exhibit 5.

18/ Third Report, at para. 173.

19/ Id.

While the distance separation of 120 kilometers can be retained for Phase I to Phase I determination of frequency re-use since nearly all of those stations already are constructed, it should be increased to 170 kilometers for Phase II to Phase I situations where the Phase II licensee is not subject to conducting an interference study.[20/] This distance separation is based on the recommended 28 dBu/18 dBu contour reference figures. The recommended modification to the contour protection figures for Phase II to Phase I licensees also will reflect a more accurate determination of harmful interference to incumbent operators.

PHASE I LICENSEES SHOULD BE PROTECTED ASSUMING MAXIMUM FACILITIES

Pursuant to **ACTION IN DOCKET CASE**, Report No. DC-1819, **FCC Adopts New Rules for Use of 220-222 MHz band by Private Land Mobile Licensees**, released March 11, 1991, the FCC stated that applications would be accepted for filing beginning the second day after publication of the Report and Order in the Federal Register. This filing scheme created an unusually short fuse in which an applicant could properly select its transmitting facility, as well as properly coordinate its sites to meet the co-channel spacing requirements in an effort to provide robust wide area network service.[21/] The 14 day period to prepare, finalize, and submit the applications to meet the one-day filing window resulted in a less than normal opportunity to design the Phase I facility to reach maximum effectiveness and to utilize the spectrum in the most efficient manner. Phase I licensees were frozen at this original configuration for a period of almost five years with no opportunity to modify their facilities as proposed in their original applications. Through the FCC's Second Report and Order, PR Docket No. 89-452, released January 26, 1996, the FCC established the procedures for Phase I licensees to modify their facilities based on extremely restrictive guidelines which, in most cases, prevented any relocation of greater than 8 kilometers.[22/] These extraordinary restrictions on the Phase I licensee's ability to maximize its operating configuration and to make the most efficient use of its licensed spectrum has significantly hindered the Phase I licensees' ability to provide a more robust service to the community of license. By example, in the nearly five (5) year period between the time the 220 MHz applications were originally filed and the time when the Commission allowed restricted modifications, many licensees lost their transmitter sites due to causes beyond their control, such as the demolition of a tower site. In many

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20/ This figure is more consistent with the predicted methodology used by the FCC to calculate the original 120 km distance since there is no contour overlap.

21/ FCC Report and Order, PR Docket No. 89-552 was released on April 17, 1991 and the one-day filing date established for 220 MHz applications was May 1, 1991.

22/ Most transmitter sites utilized in the initial application phase, therefore, were randomly selected without giving consideration to same market, adjacent channel design. Hence, many same market 220 MHz facilities are scattered throughout the community which prevents an opportunity to provide spectrally efficient service through co-location techniques.

instances, the alternative site was beyond 8 km of the original location making a modification impossible to achieve. Allowing Phase II licensees to protect only the licensed configuration rather than the maximum facilities of a Phase I operator effectively ensures that a Phase I licensee will not be able to provide maximum service to the public.

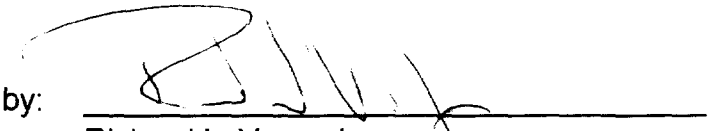
IV.
SUMMARY CONCLUSION

Based on this report's findings, the FCC should:

- Adopt the more appropriate 170 km distance separation requirement for Phase II licensees to Phase II licensees or, Phase II licensees to Phase I maximum allowable facilities if contour protection showing is not sought;

- Adopt a more practical 28 dBu protected contour with an 18 dBu interfering contour for calculating the potential of interference from Phase II to Phase I facilities utilizing the FCC's F(50-50) and F(50-10) curves; and,

- Require all Phase II licensees to calculate interference to the maximum allowable facilities of a Phase I licensee, even if the Phase I licensee is operating at less than a maximum allowable facility.

Signed by: 

Richard L. Vega, Jr.
The Richard L. Vega Group, Inc.
1245 West Fairbanks Avenue, Suite 380
Winter Park, Florida 32789-4878
Telephone: (407) 539-6540
Facsimile: (407) 539-6547

Date: June 17, 1997

AFFIDAVIT

I, Richard L. Vega, Jr., being first duly sworn, state that I am President of an engineering/consulting communications business; that my qualifications as technical consultant and expert in radio engineering are a matter of record with the Federal Communications Commission; that the foregoing was prepared by me or under my direct supervision; and that the statements contained therein are true of my own personal knowledge except for those stated to be on information and belief; and as to those statements, I believe them to be true and correct.

By: _____
Richard L. Vega, Jr.

Sworn to and subscribed before me this
17th day of June, 1997.

_____
Notary Public - Shirley H. Phillips

NOTARY PUBLIC STATE OF FLORIDA
Shirley H Phillips
My Commission CC
Expires December 8, 2000

EXHIBIT 1

COMPARATIVE PROTECTED CONTOUR FIGURES FOR TELEVISION VS SMR

SERVICE	FREQUENCY	PROTECTED CONTOUR
Television CH. 69	801 MHz	64 dBu
Television CH. 13	216 MHz	56 dBu
		(-8 dB Difference)
SMR 800/900	800/900 MHz	40 dBu
SMR 220	221 MHz	38 dBu
		(-2 dB Difference)

Both services utilize the F(50-50) and F(50-10) contour curves referenced in Section 73.699 of the FCC's Rules to calculate its respective protected contour.

EXHIBIT 2

COMPARATIVE PROTECTED CONTOUR FIGURES FOR CELLULAR VS 220 MHZ*

SERVICE	FREQUENCY	PROTECTED CONTOUR
Cellular Radio	824-894 MHz	32 dBu
SMR 220	221 MHz	38 dBu (6 dB Difference)

Comparison based on Commission's current rules pertaining to each service.

*SMR 220 has an interference ratio 8 dB lower than cellular.

EXHIBIT 3

220 MHz SIGNAL STRENGTH FIELD DATA*

Measurements based on 8 radials beginning at true north taken at a distance of 16, 32, and 48 miles. A Hewlett Packard spectrum analyzer was used in conjunction with a 1/4 wavelength Antennex unigain antenna to collect data. The antenna was tuned for minimal reflective power reception.

DISTANCE FROM TX SITE	0° AZIMUTH	225° AZIMUTH	270° AZIMUTH	315° AZIMUTH
16 miles	-83 dBm	-80 dBm	-80 dBm	-85 dBm
32 miles	-90 dBm	-85 dBm	-85 dBm	-95 dBm
48 miles	-100 dBm	-93 dBm	-88 dBm	N/A**

* This data was collected from a 220 facility at Tiger Mountain (47-29-15/121-56-45) approximately 20 miles southeast of Seattle, Washington. The facility transmits 5 watts ERP at a height of 981 meters AMSL. Data at azimuths 45°, 90°, 135°, and 180° was unavailable due to mountainous terrain.

** This area located over water making data unavailable.

EXHIBIT 4

CO-CHANNEL DISTANCE SEPARATION

AND CONTOUR STUDY BASED ON

CURRENT 220 MHz FACILITIES CONFIGURATION

(500 WATTS/150 METER HAAT)

Prepared by: ***THE RICHARD L. VEGA GROUP***
1245 West Fairbanks Avenue, Suite 380
Winter Park, Florida 32789-4878
Telephone: (407) 539-6540
Facsimile: (407) 539-6547